



STATE OF HAWAII
DEPARTMENT OF HEALTH
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In reply, please refer to:
File:

Issue Date

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VIA E-MAIL

Mr. Steve Wall
LND-2-3
USEPA Region 9
75 Hawthorne Street
San Francisco, CA 94105

Dear Mr. Wall:

SUBJECT: Beneficial Use of Coal Combustion Residuals For Fire Protection and Waste Solidification At PVT Construction and Demolition Landfill, Nanakuli, Hawaii

The State of Hawaii, Department of Health (HDOH), Solid and Hazardous Waste Branch (SHWB) has determined that the application of coal ash for fire prevention and liquid waste solidification at PVT Construction and Demolition Landfill (PVT), is an appropriate beneficial use under Hawaii state solid waste regulations and hereby justifies such application being excluded from the U.S. Environmental Protection Agency's (EPA's) Coal Combustion Residuals (CCR) rules (the "CCR Rules"). The application of coal ash at PVT for fire prevention and liquid waste solidification was first reviewed and approved by the SHWB as a beneficial use on May 4, 2006, prior to the effective date of the CCR Rules. Beneficial use of CCR was later incorporated into PVT's solid waste facility permit renewal and modification (LF-152-09) issued by HDOH on May 5, 2011. HDOH's approval of CCR for beneficial use at PVT is based in part upon information provided in PVT's April 7, 2006 letter seeking approval to reuse ash as a fire control product, an evaluation of the risk to human health and the environment initially submitted in June 2005 and updated in February 2010 by AMEC Earth and Environmental Inc., and information collected from continuing groundwater monitoring data collected on a bi-annual basis.

PVT was first granted approval on May 4, 2006 to beneficially use fluidized bed combustion ash (FBCA) obtained from a coal-fired fluidized bed boiler that generates steam to produce power for an independent power producer to be used as a soil replacement for the construction of fire barriers within the waste mass, as void space fill within the waste mass (to minimize air intrusion and prevent fire conditions), for solidification of liquid waste and eventual disposal into the landfill, and to aid in the construction of the operations layer. FBCA ceased being used for the construction of the operations layer sometime in June 2015 due to the fact that PVT completed liner construction at that time. All other uses of FBCA continue.

FBCA consists of a maximum of 70% bed ash on a dry weight basis, fly ash, and water. The SHWB has limited the beneficial use of FBCA as fire barrier and void space fill at PVT to just 20% of the total volume of waste disposed in the lined portion of the landfill on an annual basis. As an additional precaution, PVT has been restricted to applying FBCA only in the lined portion of the landfill that generally meets the liner design requirements of 40 CFR Part 258 Subtitle D (Subtitle D). Similarly, solidified liquid waste with FBCA may only be placed in the lined portion of the landfill. Approval for the use of FBCA in this manner was based on its replacement of soil and a risk-based analysis that demonstrates the noncancer hazard quotient to be less than 1, and the excess cancer lifetime risk to be less than 1×10^{-6} , as stated in the February 2010 report by AMEC Earth and Environmental Inc.

With respect to the applicability of the CCR Rules to PVT's use of CCR for fire prevention/void space fill and solidification, the SHWB finds the definitional language promulgated by EPA justifies the use of CCR at PVT. EPA requires the "beneficial use of CCR" to meet the following conditions:

- (1) *The CCR must provide a functional benefit;*
- (2) *The CCR must substitute for the use of a virgin material, conserving natural resources that would otherwise need to be obtained through practices such as extraction;*
- (3) *The use of CCR must meet relevant product specifications, regulatory standards, or design standards when available, and when such standards are not available, CCR are not used in excess quantities; and*
- (4) *When unencapsulated use of CCR involving the placement on the land of 12,400 tons or more in non-roadway applications, the user must demonstrate and keep records, and provide such documentation upon request, that environmental releases to groundwater, surface water, soil and air are comparable to or lower than those from analogous products made without CCR, or that environmental releases to groundwater, surface water, soil and air will be at or below relevant regulatory and health-based benchmarks for human and ecological receptors during use.*

[40 CFR §257.53]

With respect to item #(4) above, EPA defines an encapsulated beneficial use of CCR as follows:

Encapsulated beneficial use means a beneficial use of CCR that binds the CCR into a solid matrix that minimizes its mobilization into the surrounding environment.

[40 CFR §257.53]

Based upon this definition of encapsulation, HDOH considers PVT's beneficial uses of CCR as a fire barrier/void space fill and to solidify liquid wastes to be an encapsulated beneficial use as envisioned by EPA. Encapsulation of CCR at PVT is achieved via a restriction of its placement into only the lined portions of the landfill. This lined portion has the following liner system (from bottom to top):

- Geosynthetic clay liner with hydraulic conductivity of 5×10^{-9} cm/sec;
- 60-mil HDPE geomembrane;
- A leachate collection and removal system consisting of a granular drainage layer with perforated HDPE pipes to maintain less than a 30 centimeter depth of leachate on the liner system
- Geotextile; and
- 3-foot operations layer to protect liner from puncture damage from waste and operations equipment.

In addition to the impermeable layer created by PVT's bottom liner, state rules applicable to the final cover system for a construction and demolition landfill such as PVT require that the final cover system either have a permeability less than or equal to the permeability of any bottom liner system, or a system that achieves an equivalent reduction in infiltration. The final cover system proposed by PVT will consist of:

- An erosion layer consisting of a minimum of one (1) foot of mixed soil and compost, seeded to perennial grasses
- An infiltration layer consisting of two (2) feet of soil compacted to achieve a maximum permeability of 5.0×10^{-6} cm/sec; and
- A foundation layer consisting of a minimum of one (1) foot of existing interim cover soil, scarified and compacted prior to placement of the infiltration layer.

Given the similarities of the proposed liner system with an alternative Subtitle D liner system, use of an active leachate collection and removal system, the ongoing groundwater monitoring program, and the proposed Subtitle D-equivalent final cover system, HDOH considers PVT's beneficial use to be "encapsulated" as that term is used by EPA. Because of this, HDOH anticipates minimal mobilization of CCR into the surrounding environment and a correspondingly low risk of potential impact on the public health and the environment. Consistent with HDOH's treatment of PVT's beneficial use as encapsulated, based upon the groundwater monitoring data collected and analyzed semi-annually since 2004, there have been no known releases of constituents from the landfill into the environment. As a consequence of this data collection, even if PVT's use of CCR were to be treated as unencapsulated, PVT's monitoring data would demonstrate that "environmental releases to groundwater, surface water, soil and air will be at or below relevant regulatory and health-based benchmarks for human and ecological receptors during use" as envisioned by 40 CFR §257.53. With respect to the other components of EPA's definition of CCR as a legitimate beneficial use in the case of PVT, HDOH reaches the following conclusions:

1. The CCR provides functional benefits by being used as a fire barrier and void-space fill for fire prevention and media for the solidification of liquid waste. Municipal solid waste landfill operations typically use daily cover soils and high compaction rates to minimize void space and air intrusion into the waste mass to prevent a fire condition. However, due to the nature of construction and demolition waste, daily cover is not always necessary from a vector, odor, and litter perspective, and under Hawaii State solid waste regulations, is not specifically required for construction and demolition waste landfills. As such, PVT Landfill chose to utilize FBCA to help with air intrusion with the periodic construction of fire barriers and placement to fill void space. Because FBCA is the result of combustion, the material will not add to a fire's fuel source. In addition, state landfill regulations restrict bulk liquid disposal, thus, to

accommodate the need for liquid waste disposal, liquid waste such as concrete coring water, storm drain pumpings, and non-hazardous oily wastewater, when those wastes cannot be recycled, are typically solidified prior to landfill disposal. FBCA has cementitious properties that efficiently and very effectively solidifies liquid waste.

2. The CCR substitutes for virgin aggregate and soil that would otherwise require extraction. Interim cover for Construction and Demolition landfills, under state solid waste landfill regulations, consist of a minimum 6-inches of earthen cover, a requirement to which PVT must adhere. In many cases, interim cover is derived from landfill excavation for construction, hence virgin soil extraction. Therefore, soil is typically the media of choice for solidification needs. However, using FBCA as a substitute for virgin soil conserves natural resources and is the preferred choice.
3. The CCR is limited to 20% by volume, so it is not used in excess quantities and its use is consistent with other applicable regulations. For the purpose of fire barriers and void space fill material, there are no specific product specification other than to be noncombustible and to prevent air intrusion as FBCA does. To further prevent its use from becoming "sham recycling," the use of FBCA in this manner is limited to 20% by volume of waste disposed of in the landfill. The 20% limitation is similar to the amount of earthen material typically used in municipal solid waste landfills as daily cover. For the purpose of waste solidification, the amount of FBCA used is limited to what is needed to solidify the waste. PVT's use of FBCA is fully consistent with both state regulatory standards and industry standards for design applicable to such an application in the context of a construction and demolition landfill.

Therefore, based upon our examination of the beneficial uses of CCR by PVT for fire control/void space fill and solidification, PVT's encapsulated beneficial use of FBCA is entirely consistent with the CCR Rules and applicable EPA guidance. If you have any questions regarding this letter, please contact Mr. Kevin Kihara of the HDOH-SHWB at (808) 586-4226.

Sincerely,

STEVEN CHANG, P.E., CHIEF
Solid and Hazardous Waste Branch

c: Wade H. Hargrove III, Deputy Attorney General